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ECONOMIC SURVEY OF THE U.S. FISHERIES IN THE PASSAMAQUODDY REGION, 1956-57

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FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR
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ECONOMIC SURVEY OF THE U.S. FISHERIES IN THE PASSAMAQUODDY REGION, 1956-57

by

Giulio Pontecorvo and Leslie W. Scattergood

[International Passamaquoddy Fisheries Board, 1956-59,
Scientific Report No. 36]

United States Fish and Wildlife Service
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CONTENTS

	Page
Introduction	1
Materials and methods	3
Primary fishery survey	3
Herring	3
Weirs	3
Stop seines	3
Carriers	3
Herring landings	8
Groundfish	9
Lobsters	10
Mollusks	11
Anadromous and catadromous fish	12
Miscellaneous	12
Secondary fishery survey	13

ECONOMIC SURVEY OF THE U.S. FISHERIES IN THE PASSAMAQUODDY REGION, 1956-57

by

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ABSTRACT

The proposed Passamaquoddy Project would be built in an area important for its fisheries. An economic survey of the primary and secondary fisheries of the area has been made. In the primary fishery, the herring was most important; clams and scallops were quite valuable; groundfish, anadromous and catadromous fish, and lobsters were of minor importance. Average value of herring landings in 1948-57 was $102,000; clams, $60,000; scallops, $15,000; and the remaining species all less than $5,000. In the Project area 24 weirs, 7 stop seiners, and 16 carriers operated. Detailed information on investments, operating costs, and profits is presented. The secondary survey covered the herring processing industry whose 28 plants manufactured $11 million worth of products.

INTRODUCTION

The proposed Passamaquoddy Project would result in the formation of two impoundments, the high and low pools, both of which lie in an important commercial fishing area. The high pool includes the western sides of the St. Croix River estuary and Passamaquoddy Bay, together with the shores and waters of the east side of Moose Island, while the low pool consists of Cobscook Bay and the shores and waters to West Quoddy Head (fig. 1).

The Passamaquoddy studies carried on under the auspices of the International Passamaquoddy Fisheries Board have been aimed towards learning the possible effects of the proposed dams on the fisheries of the area. This report gives information on the value of the U.S. Passamaquoddy region fisheries and provides a basis for evaluating the economic impact of any change in the primary and secondary fisheries.

The economic survey of the fisheries of the Maine area of the Passamaquoddy Project covered both the primary and secondary

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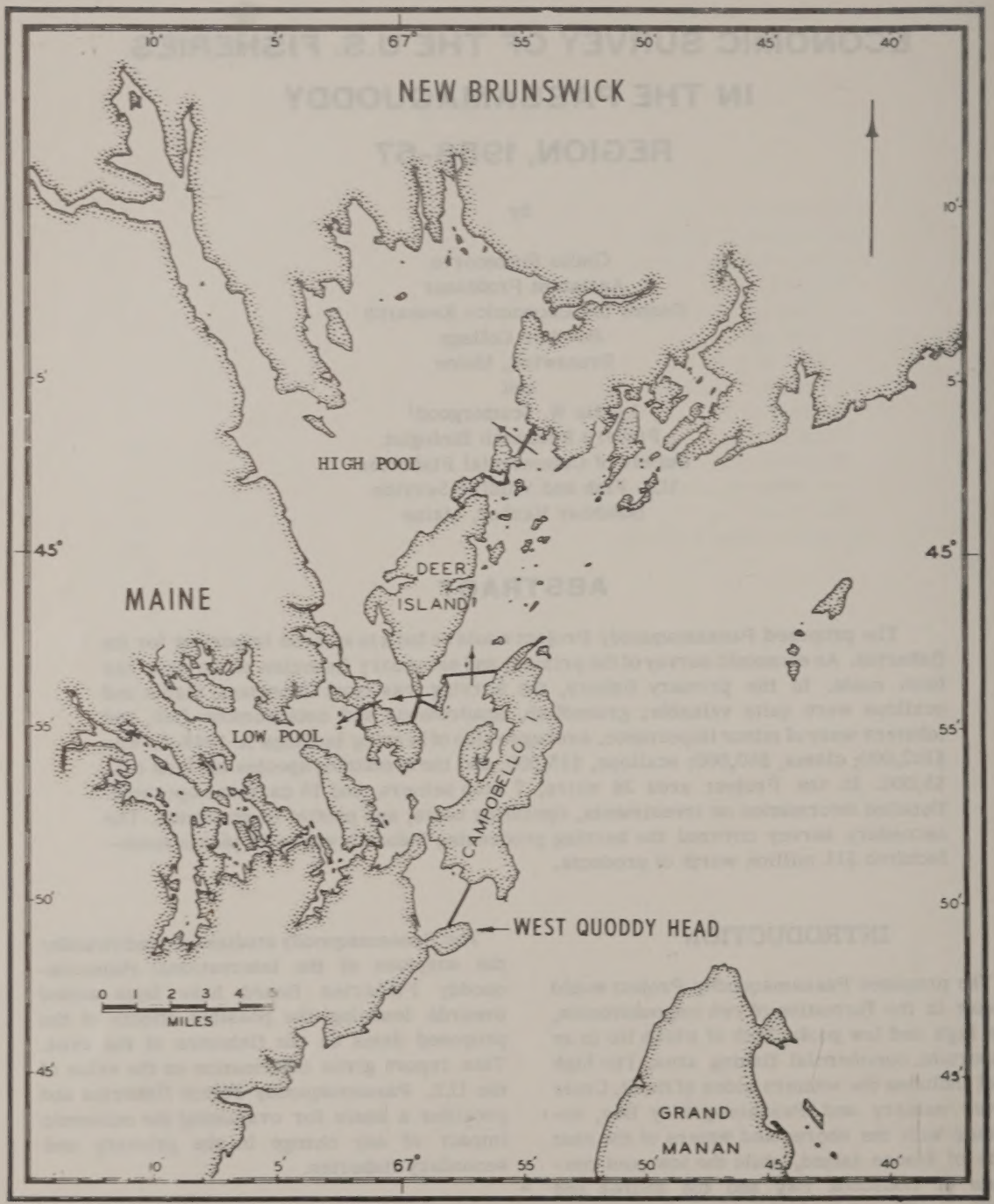

Figure 1.--Chart of the Passamaquoddy Project area.

fisheries. The primary fisheries concerns all activities associated with catching and delivering fish to the processing plants. The secondary fishery is composed of fish processing activities that occur after the fish are delivered to the plants.

MATERIALS AND METHODS

Information on the economics of the Maine Passamoquoddy Project area was obtained from several sources. Robert Dow of the Maine Department of Sea and Shore Fisheries collected most of the data on the values of the primary fishery landings. His sources were the statistical publication *Maine Landings* and personal interviews with fishermen, fish dealers and processors, and wardens of the Maine Department of Sea and Shore Fisheries. Lewis Lozier and John Wentworth of the Bureau of Commercial Fisheries interviewed weir operators, stop seiners, owners of herring carriers, and fish processors. D. A. McKown of the same Bureau provided data on the secondary fishery industries.

PRIMARY FISHERY SURVEY

Herring

The primary survey of the U.S. Passamaquoddy herring fishery covered with the operation of the weirs, stop seines, and carriers.

Weirs.--In 1957, there were 19 weir enterprises, which represented 24 weirs (fig. 2). This number includes one operator who owned five patent weirs, three of which were not put into operation because no herring were seen in the vicinity. A patent weir has stakes to which seines are attached when herring appear.

Basic data on the economics of gear operation were collected during the survey of the weir fishery (tables 1 and 2). The average value of a weir was $3,930. This sum included the costs of the material that made the weir, but not the entire labor costs, because only the poledriving expenses were known. Annual operating expenditures per weir were $622 for 1956 and $649 for 1957. Included in operating expenses are netting, land rentals, transportation, boat operating expenses and repairs, some labor, and other costs.

The weir investment is obtained by adding the capital value of the weir to the inventory value (table 3). In 1956, the average weir investment was $5,492; in 1957, it was $5,555. The average gross income per weir was $2,286 in 1956 and $1,478 in 1957. The net cash return per weir was $1,664 in 1956 and $829 in 1957. Average expenses for 1956 were $622 and for 1957 were $649.

Table 4 shows the nature and value of the gear that is associated with weir operations; that gear has also been entered in table 3 as Inventories. Boats, scows, rafts, seines, piledrivers, and shore equipment are all necessary for the operation of the weirs.

About 40 men engaged in the weir fishery, and most of them were between 55 and 65 years old. Only one was less than 40 years old. This may indicate the marginal nature and limited future of this fishery.

Stop seines.--Seven stop seiners operated in the Project area. Their total original capital equipment investment averaged over $15,000 (table 5). The average value of equipment in 1956 was less than $8,000 and in 1957 was over $9,000. Average gross income per seiner was over $7,000 in 1956 and $6,000 in 1957. Expenses averaged about $1,600 (table 6).

There were about 30 men on the seven stop seine crews. Each crew man earned approximately $1,000 in 1956 and in 1957.

Carriers.--Sixteen U.S. sardine carriers operated in the Project area. These were owned by eight sardine plants. In 1957, the estimated values of the carriers was $291,000, an average

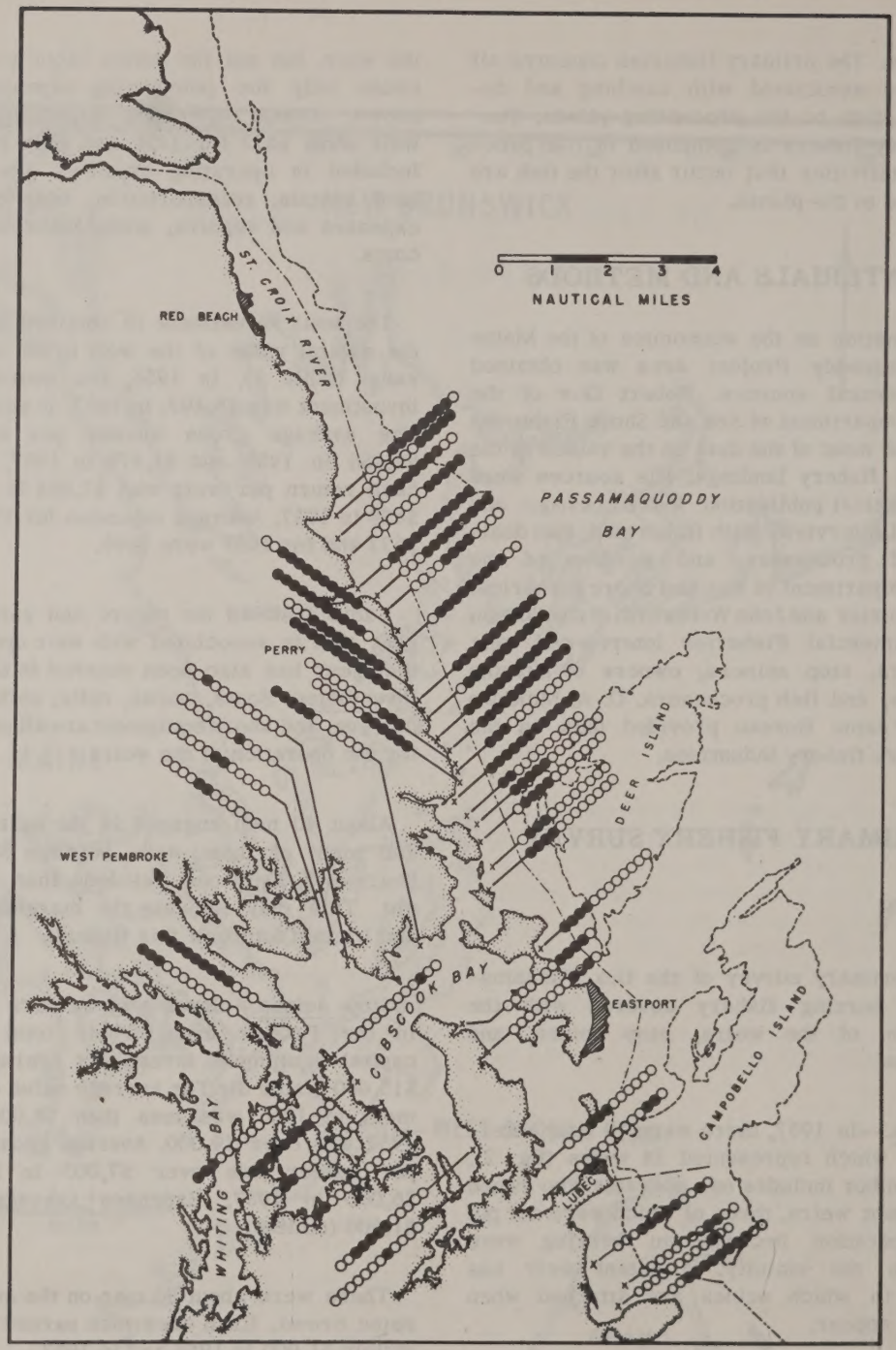

Figure 2.--U.S. weir locations in the Passamaquoddy Project area. A black dot indicates that the weir was operating; a circle indicates that it was not operating. Each circle or dot represents a single year; the year 1947 is nearest the weir location and 1958 is at the extremity of the row.

Table 1.--Cost of weir material for 24 Maine weirs, 1956 and 1957[1]

[In dollars]

Stakes[2]	Top nets	Bottom nets	Pole driving cost	Fence seine	Bottom brush	Wire[3] rope	Ribbands	Drop nets	Pocket seine	Rope	Hardware	Top poles	Top brush	Pier material	Rack band poles	Rack legs	Anchor	Total
195	700	700	160	6,150	---	---	175	120	2,150	325	50	---	---	---	---	---	95	10,820
1,780	1,000	1,550	400	---	900	---	400	185	---	86	240	263	100	---	8	1	---	6,913
1,660	1,000	1,550	400	---	900	---	450	185	---	86	240	249	100	---	7	1	---	6,828
2,010	1,022	1,000	800	---	300	---	250	160	---	60	90	135	100	---	---	---	---	5,927
1,015	900	1,500	300	---	200	---	150	---	---	136	120	107	48	---	20	---	---	4,496
443	1,300	950	500	300	---	744	90	40	---	---	---	---	---	---	---	---	---	[4] 4,457
450	1,295	1,000	600	---	---	859	---	40	---	---	---	---	---	---	---	---	---	[4] 4,224
2,190	75	75	400	---	200	---	75	---	---	400	300	265	72	90	---	---	---	4,142
1,724	750	350	400	---	240	---	175	100	---	20	72	52	80	---	---	---	---	3,961
1,040	750	300	350	---	500	---	90	135	---	105	144	89	200	---	---	---	---	3,703
1,050	890	425	175	---	200	---	300	105	---	80	125	171	80	---	---	---	---	3,603
630	567	1,712	160	---	110	---	120	52	---	46	96	56	---	---	---	---	---	3,549
875	690	460	225	---	140	---	160	105	---	85	123	135	150	100	---	---	---	3,248
1,460	900	350	75	---	---	---	85	100	---	150	50	---	60	---	---	---	---	[4] 3,230
1,140	820	---	300	---	300	---	100	80	---	75	80	122	100	---	---	---	---	3,117
399	850	1,000	400	---	84	---	76	180	---	58	60	8	---	---	---	---	---	[4] 3,115
295	800	1,400	289	---	---	308	---	40	---	---	---	---	---	---	---	---	---	[4] 3,092
1,080	750	113	200	---	200	---	130	135	---	165	114	130	30	---	---	---	---	3,047
375	800	835	300	---	---	308	---	40	---	---	---	---	---	---	---	---	---	[4] 2,858
749	800	---	250	---	140	---	150	108	---	60	140	52	---	---	121	85	---	2,695
570	500	---	250	---	96	---	150	225	---	138	---	70	80	25	28	28	---	2,160
450	---	---	600	---	---	1,061	---	---	---	---	---	---	---	---	---	---	---	[4] 2,111
471	875	---	150	---	160	---	20	50	---	60	56	47	---	---	---	---	---	1,889
375	---	---	500	---	---	308	---	---	---	---	---	---	---	---	---	---	---	[4] 1,183
TOTALS 22,386	18,014	15,270	8,474	6,450	4,670	3,588	3,146	2,185	2,150	2,135	2,100	1,953	1,200	215	184	115	95	94,330
PERCENT 23.7	19.1	16.2	9.0	6.8	5.0	3.8	3.3	2.3	2.3	2.3	2.2	2.1	1.3	0.2	0.2	0.1	0.1	

Mean..... $3,930
Median..... 3,399
High..... 10,820
Low..... 1,183

[1] There are two types of weirs: patent and beach.

[2] A beach weir has an average of 104 stakes in the weir itself and 82 stakes in the leader. Usually there is one leader per weir. The pound uses on the average 41 stakes. These stakes are approximately 6 feet apart. The patent weir has an average of 29 stakes in the weir and 14 stakes in the leader. Usually two leaders, but no pound, are used. The stakes in a patent weir are about 25 to 30 feet apart. Stakes average 25 to 30 feet long.

[3] Wire rope was used around the stakes to facilitate the hanging of seines.

[4] Patent weir.

Table 2.--Analysis of operating expenditures for 24 Maine weirs

[In dollars]

Weir[1] material 1956	Weir material 1957	Netting 1956	Netting 1957	Rental[2] paid 1956	Rental paid 1957	Trans-portation 1956	Trans-portation 1957	Gas & oil 1956	Gas & oil 1957	Boat repair 1956	Boat repair 1957	Cash[3] labor 1956	Cash labor 1957	Other[4] 1956	Other 1957	Total 1956	Total 1957	Grand total	2-year[5] average
430	360	770	180	828	1,161	625	625	38	35	---	---	---	---	10	10	2,701	2,371	5,072	2,536
965	1,089	51	106	---	---	---	---	352	365	295	280	205	365	32	21	1,900	2,226	4,126	2,063
585	615	80	50	262	303	---	---	100	75	---	---	150	175	10	10	1,187	1,228	2,415	1,208
796	479	40	745	---	---	---	---	50	50	25	25	50	---	10	10	971	1,309	2,280	1,140
460	340	352	77	---	---	200	200	150	150	---	30	25	---	10	10	1,197	807	2,004	1,002
588	482	32	---	---	---	150	150	150	150	90	75	---	---	10	10	1,020	867	1,887	943
250	460	35	55	---	---	---	---	100	80	145	130	120	135	10	10	660	870	1,530	[6] 765
350	241	545	137	---	---	25	25	28	20	32	15	25	25	24	25	1,029	488	1,517	759
431	462	50	336	---	---	---	---	---	20	---	---	45	50	10	22	536	890	1,426	713
463	257	40	385	---	---	--	---	50	50	65	61	25	---	10	10	653	763	1,416	708
249	285	62	112	---	---	150	150	59	58	15	12	15	25	10	10	560	652	1,212	606
495	495	13	13	50	50	---	---	5	5	---	---	---	50	10	10	573	623	1,196	598
97	79	---	300	---	---	100	100	4	9	40	9	50	25	10	10	301	732	1,033	516
165	158	71	15	---	---	-	---	20	30	200	189	45	70	10	10	511	472	983	491
124	112	55	20	---	---	100	100	22	22	50	50	50	50	10	10	411	364	775	[6] 388
---	---	450	---	204	---	---	---	---	---	---	---	---	---	10	---	664	---	664	[6] 332
---	305	---	32	---	240	---	---	---	28	---	---	---	25	---	10	---	640	640	320
---	75	---	50	---	---	---	25	---	25	---	20	---	25	---	10	---	230	230	[6] 115
---	10	20	---	---	---	---	---	25	13	8	8	---	---	10	10	63	41	104	52
Total....6,448	6,304	2,666	2,813	1,344	1,754	1,350	1,375	1,153	1,185	965	904	805	1,020	206	218	14,937	15,573	30,510	15,255
2-year Av.....	41.8%	17.9%		10.2%		8.9%		7.7%		6.1 %		6.0 %		1.4%					

Mean	635
Median -	557
High	2536
Low	0

[1] Weir material includes cost of stakes, marlin poles, ribbands, brush, hardware, rope, and nails.
[2] Represents amount paid to land owners for privilege of building weirs. Usually 15 to 20 percent of gross stock.
[3] Cash labor applies only to driving cost of stakes. No other labor figures available.
[4] Other includes licenses and taxes.
[5] Five additional patent weirs with no operating expenditures.
[6] Patent weirs.

Table 3.--Investments, inventories, expenses, and receipts of 24 Maine weirs, 1956 and 1957

[In dollars]

Weir capital 1957	Inventories			Expenses		
	1956	1957	Average	1956	1957	Average
3,047	1,355	1,880	1,618	1,020	867	943
3,230	1,409	1,302	1,355	664	---	332
2,655	735	667	701	63	41	52
10,820	2,614	2,355	2,485	660	870	765
3,963	1,133	1,034	1,083	560	652	606
2,160	2,390	2,253	2,322	511	472	491
4,142	1,728	1,651	1,690	1,197	807	1,002
3,703	1,648	2,140	1,894	971	1,309	1,140
3,549	839	1,149	994	653	763	708
1,889	900	852	876	1,029	488	759
4,496	464	912	688	301	732	517
5,927	1,641	1,677	1,659	2,701	2,371	2,536
3,117	739	1,287	1,013	573	623	598
6,828	2,537	2,528	2,532	1,900	2,226	2,063
3,115	1,292	1,549	1,420	411	364	388
3,248	861	771	816	536	890	713
3,603	---	780	780	---	640	320
6,913	1,113	1,986	1,550	1,187	1,228	1,207
2,858	1,087	1,107	1,097	---	230	115
[1] 4,224	12,984	11,121	12,052	---	---	---
[1] 2,111	---	---	---	---	---	---
[1] 4,457	---	---	---	---	---	---
[1] 1,183	---	---	---	---	---	---
[1] 3,092	---	---	---	---	---	---
Total.....94,330	37,469	39,001	38,235	14,937	15,573	15,255
Average..... 3,930	1,561	1,625	1,593	622	649	636

Weir capital 1957	Gross receipts			Net receipts		
	1956	1957	Average	1956	1957	Average
3,047	1,703	1,465	1,584	683	598	640
3,230	1,703	---	851	1,039	---	520
2,655	1,500	700	1,100	1,437	659	1,048
10,820	---	676	338	-660	-194	-427
3,963	3,000	2,700	2,850	2,440	2,048	2,244
2,160	6,373	3,169	4,771	5,862	2,697	4,280
4,142	7,648	1,445	4,547	6,451	638	3,545
3,703	3,994	1,477	2,736	3,023	168	1,595
3,549	3,561	3,055	3,308	2,908	2,292	2,600
1,889	2,065	1,358	1,711	1,036	870	953
4,496	---	2,817	1,409	-301	2,085	892
5,927	9,669	7,377	8,523	6,968	5,006	5,987
3,117	1,921	1,055	1,488	1,348	432	890
6,828	2,505	1,990	2,248	605	-236	184
3,115	326	451	388	-85	87	1
3,248	7,595	2,297	4,946	7,059	1,407	4,233
3,603	---	1,600	800	---	960	480
6,913	1,309	1,565	1,437	122	337	230
2,858	---	263	132	---	33	16
[1] 4,224	---	---	---	---	---	---
[1] 2,111	---	---	---	---	---	---
[1] 4,457	---	---	---	---	---	---
[1] 1,183	---	---	---	---	---	---
[1] 3,092	---	---	---	---	---	---
Total.....94,330	54,872	35,460	45,167	39,935	19,887	29,911
Average..... 3,930	2,286	1,478	1,882	1,664	829	1,246

[1] Patent weirs. These weirs did not catch any herring in 1956 and 1957, but were ready to be put into fishing condition if fish appeared in the area. Fishing condition means putting twine around the stakes, a task that requires several tides to accomplish.

Table 4.--Analysis of associated gear for 19 Maine weir enterprises (24 weirs), 1956 and 1957

[In dollars]

1956

Motor boats	Other boats	Weir scows	Rafts	Seine racks	Seine nets	Pile-drivers	Herring purse seines	Herring shut-off seines	Shore equip-ment	Miscel-laneous
964	225	---	350	---	450	500	---	---	---	275
---	155	---	75	---	305	---	---	---	150	50
160	1,364	---	---	250	390	---	---	300	---	150
360	135	180	---	---	308	100	---	---	---	50
325	400	---	150	---	850	---	---	---	500	165
---	148	---	150	---	500	---	---	---	700	230
428	170	700	---	---	150	---	---	---	---	200
214	---	---	150	---	250	---	---	---	---	225
---	300	100	---	---	400	---	---	---	---	100
228	25	---	---	---	211	---	---	---	---	---
426	110	---	---	---	790	315	---	---	---	---
279	276	184	---	---	---	---	---	---	---	---
155	748	---	---	---	734	700	---	---	200	---
107	548	---	---	---	---	---	616	---	---	21
---	---	---	---	---	---	---	---	---	---	---
872	5,712	---	---	---	---	1,200	600	1,100	3,500	---
152	319	50	---	---	517	---	---	---	---	75
370	92	---	---	---	550	---	---	---	---	75
200	50	---	150	---	336	---	---	---	---	125
Average.....276	567	64	54	13	355	148	64	74	266	92

1957

886	225	---	350	---	946	500	---	---	---	275
---	142	---	75	---	250	---	---	---	150	50
160	1,245	---	---	250	300	---	---	250	---	150
340	122	156	---	---	266	100	---	---	---	50
305	350	---	150	---	808	---	---	---	500	140
---	123	---	150	---	462	---	---	---	700	216
385	155	600	---	---	825	---	---	---	---	175
204	---	---	150	---	595	---	---	---	---	200
---	300	100	---	---	352	---	---	---	---	100
216	25	---	---	---	671	---	---	---	---	---
394	235	---	---	---	750	298	---	---	---	---
267	252	168	---	---	450	---	---	---	---	150
369	676	---	---	---	618	665	---	---	200	---
354	642	---	---	---	---	---	532	---	---	21
---	80	150	---	---	475	---	---	---	---	75
783	4,813	---	---	---	---	1,000	525	1,000	3,000	---
386	291	50	---	---	1,184	---	---	---	---	75
348	234	---	---	---	475	---	---	---	---	50
150	50	---	150	---	296	---	---	---	---	125
Average.....292	524	64	54	13	512	135	56	66	239	97

of $18,000 per carrier (table 7). On an original cost basis, the average carrier was worth $25,000; however, the average age was about 27 years. Most of these boats are well equipped, with fish pumps, radios, radar, and other electronic equipment. Average operating expenses in 1956 and 1957 were about $4,000, and their freighting services (carrying fish from fishermen to factory) averaged approximately $6,000 in each of the 2 years.

Herring landings.--The value of herring landings in the Project area has averaged about $103,000 for the period 1948-57. The range has been from $75,000 to $184,000 (table 8).

Table 5.--Investments and inventories, expenses, receipts, and profits of seven stop seiners

[In dollars]

Original	Investments and inventories			Expenses		
	1956	1957	Average	1956	1957	Average
17,490	10,734	11,030	10,882	3,498	3,473	3,485
23,733	9,730	12,905	11,317	2,090	2,095	2,092
20,635	11,955	12,050	12,003	1,435	1,720	1,578
12,830	8,611	7,439	8,025	1,285	1,060	1,173
9,700	3,175	2,800	2,987	1,030	311	670
13,040	2,309	11,760	7,035	1,012	982	998
9,735	6,621	6,470	6,545	1,277	1,487	1,382
Total... 107,163	53,135	64,454	58,794	11,627	11,128	11,378
Average. 15,309	7,591	9,208	8,399	1,661	1,590	1,625

Original	Gross receipts			Gross profits		
	1956	1957	Average	1956	1957	Average
17,490	16,000	19,000	17,500	12,502	15,527	14,015
23,733	11,144	6,925	9,035	9,054	4,830	6,942
20,635	10,688	5,863	8,275	9,253	4,143	6,698
12,830	12,141	3,125	7,633	10,856	2,065	6,460
9,700	2,065	---	1,033	1,035	-311	362
13,040	6,600	4,300	5,450	5,588	3,318	4,453
9,735	4,964	15,888	10,426	3,687	14,401	9,044
Total... 107,163	63,602	55,101	59,352	51,975	43,973	47,974
Average. 15,309	9,086	7,872	8,479	7,425	6,282	6,853

Groundfish

Three species of groundfish are of minor importance in the area (table 9). Most of the catch is taken in the low pool, with only about 1,000 pounds being caught in the high pool. Table 9 does not include illegal otter trawl catches made occasionally in the area by boats that violate the law under the cover of darkness or fog. We have heard estimates that the illegal catch of haddock is about 100,000 pounds annually, but have no information on the accuracy of these reports.

The legal catches of cod and haddock are taken by handlines and longlines and are worth only a few thousand dollars. Between 1948 and 1957 cod landings averaged $800, with a range of $400 to $2,100. Values of haddock catches ranged from $1,000 to $3,100, with an average of $1,800.

Pollock are caught principally by lift nets that are effective in taking schools of small "harbor" pollock, which usually occur in great numbers in the region, particularly near the processing plants in Eastport and Lubec.

Table 6.--Expenses of seven stop seiners, in dollars

[In dollars]

	1956	1957	Average	Percent
Gas & oil.....	2,150	2,085	2,118	18.6
Boat repair.....	1,750	1,560	1,655	14.5
Engine repair.....	525	1,200	863	7.6
Equipment repair.....	775	750	762	6.7
Rope.....	1,185	970	1,078	9.5
Food.....	4,200	3,651	3,925	34.5
Clothing.....	350	335	342	3.0
License.....	87	87	87	0.8
Other.....	605	490	548	4.8
Total.....	11,627	11,128	11,378	100.0
Average per seiner....	1,661	1,590	1,625	

Table 7.--Values, expenses, and earnings of United States herring carriers

[In dollars]

Acquired cost boat and equipment	Current market value boat and equipment		Total expenses			Freighting earnings		
	1956	1957	1956	1957	Average	1956	1957	Average
31,000	20,000	20,000	4,175	4,327	4,251	13,560	3,456	8,508
8,850	18,300	18,300	3,373	924	2,149	4,016	368	2,192
6,700	---	6,700	---	2,786	1,393	---	365	182
27,850	21,080	24,930	4,642	8,379	6,510	9,398	12,756	11,077
21,850	18,800	22,650	4,639	6,227	5,433	5,706	6,036	5,871
18,000	12,500	12,500	2,212	4,039	3,126	6,595	5,861	6,228
89,158	38,100	38,100	13,027	6,954	9,990	13,987	8,882	11,435
73,491	35,700	35,700	10,148	8,558	9,353	14,003	8,766	11,384
7,820	3,700	3,700	2,049	2,349	2,199	1,953	2,727	2,340
11,206	10,925	10,925	4,898	5,454	5,176	2,657	5,564	4,110
6,900	6,200	6,200	2,942	---	1,471	3,535	---	1,768
30,750	25,750	25,200	2,608	3,893	3,251	---	14,184	7,092
7,600	4,750	6,250	2,023	4,915	3,469	4,927	12,691	8,809
17,900	18,800	22,800	3,002	3,171	3,086	6,000	6,957	6,479
17,900	15,800	19,800	2,815	1,985	2,400	5,053	7,056	6,054
15,900	13,800	17,800	2,057	1,567	1,812	5,834	8,220	7,027
Total..... 392,875	264,205	291,555	64,610	65,528	65,069	97,224	103,889	100,556
Average per carrier..... 24,555	16,513	18,222	4,038	4,096	4,067	6,077	6,493	6,285

Annual catches of the lift net fishery in 1956 and 1957 were worth about $3,000. The investments in lift net gear averaged about $100 per net. The number of persons engaged in the lift net fishery has varied from year to year, from about 6 to more than 50. In 1957, there were three lift nets.

Lobsters

The lobster fishery of the Passamaquoddy Project area has always been of minor importance. Lobsters are not abundant there, and the catches made along the U.S. shore are small (table 10). Within the area, the

Table 8.--Value of herring landings in Passamaquoddy Project area, 1948-57

Year	Value
	Dollars
1948.....	94,442
1949.....	109,901
1950.....	41,103
1951.....	141,158
1952.....	111,206
1953.....	184,281
1954.....	98,098
1955.....	69,451
1956.....	75,078
1957.....	103,010
Average.....	102,773

number of lobster fishing licenses has varied between 56 and 78 during 1948-57; however, most of the fishermen operate outside the impoundment area. About 15 to 20 part-time fishermen catch lobsters for their own use. The total annual landings in both high and low pools averaged only about one thousand pounds. Total investments in lobster traps do not exceed $400.

Mollusks

There are three commercially important mollusks in the Passamaquoddy Project area. They are in order of importance: clams, scallops, and periwinkles. During 1948-57 the annual value of the clam landings ranged from about $16,000 to $90,000 and averaged almost $60,000 (table 11). The scallops had an average annual value of over $15,000, with a range of about $7,000 to $29,000. The periwinkles annual average value was almost $2,000 with a range of about $200 to over $5,000. Preliminary information indicates that clam production in the Project area declined about 100,000 pounds in 1957, representing a decrease in value of about $32,000 from 1958; scallop landings dropped to $1,635--the lowest value in recent years.

Investments in the mollusk fishery were small. The 108 clam diggers in the area had equipment worth about $3,000. Locally owned scalloping equipment was less than $5,000. A periwinkle fisherman requires nothing more elaborate than a galvanized pail, so his investment is negligible.

Table 9.--Value of groundfish landings in low pool, 1948-57[1]

[In dollars]

Year	Cod	Haddock	Pollock	Total
1948.....	1,509	3,170	4,466	9,145
1949.....	530	2,237	4,636	7,403
1950.....	798	1,261	1,371	3,430
1951.....	406	1,469	2,273	4,148
1952.....	698	2,683	1,835	5,216
1953.....	409	1,923	6,827	9,159
1954.....	493	1,672	[2] 275	2,440
1955.....	2,069	1,022	1,663	4,754
1956.....	595	1,374	2,689	4,658
1957.....	550	1,455	2,518	4,523
Average.....	806	1,827	2,855	5,488

[1] About $100 worth of cod are caught yearly in the high pool.
[2] Handline and longline only.

Table 10.--Value of lobster landings in Passamaquoddy Project area 1948-57

Year	Value
	Dollars
1948.....	389
1949.....	380
1950.....	298
1951.....	151
1952.....	395
1953.....	436
1954.....	362
1955.....	480
1956.....	449
1957.....	421
Average.....	376

Anadromous and Catadromous Fish

There are three important anadromous and one catadromous fish in the Passamaquoddy Project area. Alewives and smelts are sought by commercial fishermen, and the salmon is the object of a sports fishery. The eel, a catadromous species, is also caught in small quantities. The value of landings of alewives, smelts, and eels has averaged about $6,000 during 1948-57 (table 12).

Investments in fishing equipment for these three species do not exceed $1,000. Not more than 6 fishermen are engaged in the alewife fishery in the Dennys River, and less than 50 in the smelt fishery in Cobscook Bay.

The salmon has no value as a commercial species, but the sports fishery is valued at between $7,000 and $9,000. The catch of salmon in the river during 1948-57 has averaged 55 fish, and ranged from 31 to 100 fish per year.

Other anadromous fish, such as lampreys, trout, and tomcod are seldom caught by the commercial or sports fisheries.

Miscellaneous

The supply of sandworms represents a potential fishery in the area, for there are concentrations of probable importance in Lubec, Pembroke, and Eastport. In 1958, worm diggers harvested 4,500 worms worth $68 in the first organized trial fishery in the area.

Table 11.--Value of mollusk landings in Passamaquoddy Project area, 1948-57

[In dollars]

Year	Clam	Scallops	Periwinkles	Total
1948.....	16,376	8,340	1,018	25,734
1949.....	61,685	6,634	713	69,032
1950.....	86,882	15,741	240	102,863
1951.....	53,187	14,139	961	68,287
1952.....	60,553	22,274	972	83,799
1953.....	68,436	9,096	2,041	79,573
1954.....	89,795	7,577	1,166	98,538
1955.....	57,097	29,282	1,571	87,950
1956.....	61,044	23,726	5,354	90,124
1957.....	43,474	17,673	4,178	65,325
Average.....	59,853	15,448	1,821	77,122

Table 12.--Value of anadromous and catadromous fish landings in Passamaquoddy Project area, 1948-57

[In dollars]

Year	Alewives	Smelts	Eels	Total
1948.....	1,717	13,765	446	15,928
1949.....	2,417	3,549	819	6,785
1950.....	2,999	3,051	1,063	7,113
1951.....	950	1,053	1,225	3,228
1952.....	3,538	1,532	1,794	6,864
1953.....	1,311	1,608	1,286	4,205
1954.....	2,347	1,370	77	3,794
1955.....	5,265	1,112	585	6,962
1956.....	4,131	1,019	794	5,944
1957.....	1,788	1,287	794	3,869
Average.....	2,646	2,935	888	6,469

SECONDARY FISHERY SURVEY

The survey of the secondary fisheries of the Passamaquoddy Project area collected information on the 1957 herring processors. These included 11 sardine packing plants, 6 smoke houses, 2 pet food canneries, and 9 fish meal and pearl essence plants.

The 11 sardine plants employed 1,349 persons, most of them on a seasonal basis, and had $3.8 million of products, principally canned sardines (table 13). Among the products packed, canned sardines in soy bean oil accounted for over $2.9 million (table 14).

In 1957, there were six smoke houses, whose 1957 assets were $80,500 (including $48,500 in buildings). They employed 133 persons during their seasonal operations. Their 1957 products were smoked herring, valued at $167,000; and waste fish and salt cod, worth $2,000.

The nine reduction plants and two pet food canneries employed 189 people in 1957. The total value of the products of these plants was in excess of $7 million, of which pet food accounted for over $5.5 million (table 15). Fish meal and pearl essence were the other two important products. The data do not include the value of fish flour made from herring. Since 1957, a plant has begun operation to attempt fish flour manufacture, and this may provide a further product for the herring fishery.

The herring industries in the U.S. Passamaquoddy section were carried on in 28 plants with almost 1,700 employees and yielded products worth almost $11 million (table 16).

Table 13.--Products of 11 Maine Passamaquoddy sardine plants, 1957

Product	Amount	Value
		Dollars
Sardines.....	549,445 cases	3,496,705
Fish waste.....	621.3 tons	7,726
Waste oil.....	---	175
Groundfish fillets.....	201,205 pounds	26,157
Other products.....	50,074 cases	246,159
Total.....	---	3,776,922

Table 14.--Canned sardine products, 11 Maine Passamaquoddy sardine plants, 1957

Product	Cases	Value
	Number	*Dollars*
100/ 1/4 Keyless Soybean Oil.....	458,076	2,746,759
100/ 1/4 Keyless Mustard Sauce.....	34,626	223,320
100/ 1/4 Keyless Olive Oil.....	7,011	99,353
100/ 1/4 Keyless Tomato Sauce.....	617	3,918
100/ 1/4 Keyless Peanut Oil.....	75	900
100/ 1/4 Keyless Soybean Oil Spiced.....	1,828	11,791
100/ 1/4 Key & Carton Soybean Oil.....	10,741	118,403
100/ 1/4 Key & Carton Mustard Sauce.....	618	6,796
48/ 3/4-12 oz. Keyless Soybean Oil.....	2,235	22,350
48/ 3/4-9 oz. Keyless Tomato Sauce.....	1,625	11,375
48/ 3/4-9 oz. Keyless Mustard Sauce.....	4,150	29,050
48/ 1/4 Keyless Soybean Oil.....	1,801	6,304
96/ 1/4 Keyless Soybean Oil.....	3,757	22,542
48/ 15 oz. Ovals Tomato Sauce.....	14,259	121,202
48/ 15 oz. Ovals Mustard Sauce.....	6,763	57,486
48/ 15 oz. Ovals Soybean Oil.....	1,263	15,156
Total.....	549,445	3,496,705

Table 15.--Products of nine Maine Passamaquoddy reduction plants and two pet food canneries

Product	Amount	Value
		Dollars
Fish meal.....	4,491 tons	597,247
Fish oil.....	176,025 gals.	88,004
Fish solubles.....	670,000 pounds	22,950
Pearl Essence.....	56,050 pounds	660,050
Pet Food.....	1,325,571 cases	5,637,800
Total.....	---	7,006,051

Table 16.--Secondary Maine Passamaquoddy herring industries, 1957

Industry	Plants	Employees	Product value
	Number	*Number*	*Dollars*
Sardine canning.....	11	1,349	3,776,922
Smoking.....	6	133	133,298
Reduction and pet food.....	11	189	7,006,051
Total.....	28	1,671	10,916,271

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